

Physics

What is a physicist?

A physicist studies how the universe works. Experimental physicists do laboratory work to discover or verify laws of nature. Theoretical physicists come up with mathematical models to describe those laws. Physicists study problems ranging from how the smallest possible particles behave to how galaxies form. We look for ways to describe how water flows through pipes, how electric circuits work, how light splits into colors, why magnets attract certain types of metals, what keeps the sun hot, what keeps molecules from falling apart, how space bends or curves, and millions of other problems.

Physics also combines with other disciplines. Applied math uses equations to predict what will happen in real-life systems. One of my favorite problems is using the “Heat Equation” to figure out the temperature of a bar of metal at any given time and at any place in the bar if I know how hot the bar is when I start. It always amazed me that equations can describe what happens in the real world. There are many other areas where physics combines other subjects such as biophysics, chemical physics, and geophysics. My own specialty is the branch of chemical physics that uses quantum mechanics to describe how atoms and molecules behave. I also recently attended a NASA conference on “Breakthrough Propulsion Physics,” which means that we looked for new ways to power space ships.



Jennifer Siders, a Ph.D. physicist at Los Alamos National Laboratory works on aligning her ultrafast Ti:Sapphire laser amplifier, which she uses to study superconducting materials.

What makes a good physicist?

Physicists are curious about why the universe works the way it does. A good physicist likes to ask questions and look for answers. A willingness to study new material and learn math is important too. One reason I love theoretical physics so much is that I thoroughly enjoy doing math. A good experimental physicist knows how to work in a lab and how to “think up” good experiments and try them out. Of course, when a student is just starting out, no one expects her to already have the skills to go into a lab or do advanced math. These are all learned, starting in school. So a good physicist is willing to study, not only in school, but all through her career.

What is life as a physicist like?

The life is exciting, frustrating, but never humdrum; in terms of hours of work and intellectual energy expended, it can at times be very demanding. A physicist is a seeker of the truth, but the truth does not always come easily. A famous physicist, Niels Bohr, has described an expert in science as one who has made all the mistakes that can be made in a very narrow field. You can be frustrated by seeing an experiment fail and by realizing that one of your pet ideas is faulty. But the pleasure in making a discovery that represents a real advancement in understanding, and the satisfaction in doing a very tricky experiment successfully, make it all worthwhile.

A typical day in the life of a physicist might involve teaching students; conducting research in a lab; investigating new ideas with a scratch pad or a computer; traveling to a professional meeting to give a short talk describing her research; visiting colleagues in other laboratories or universities; preparing a paper for a scientific journal; reviewing scientific literature; or supervising co-workers or lab technicians.

How do I become a physicist?

To become a physicist, you should take as much math and science as possible. Math is particularly important. Get to know your teachers. At the high school stage and lower grade levels, become involved in science fairs. In college, ask a professor whose work interests you if you can do a research project with him or her. Join physics or science clubs and read magazines such as *Scientific American*.

However, there is no one path to becoming a physicist. I was a ballet dancer when I entered college. I knew I liked science and math, but didn't realize how much until I started taking classes outside my major. I ended up earning a B.S. in chemistry, with my undergraduate thesis in chemical physics. In graduate school I earned a master's degree in physics and a doctorate in chemical physics, specializing in atomic and molecular theory. So I came to the discipline along what is considered an unusual path. The way I did it was by studying hard, working on research projects for professors, and obtaining undergraduate fellowships to do summer work in the field. It meant long hours of study to catch up on the gaps in my background, but I thoroughly enjoyed it.

Where/what are the jobs?

There are many possible jobs for physicists. Many become professors at universities or colleges or teach in high school, middle school, or elementary school. Others go to work for industry, in companies ranging from small start-up business all the way up through the major technology companies. Some physicists' knowledge of computers leads them into the computer industry. Some theoretical physicists use their math expertise for jobs in the world of finance. Some physicists go to work for places such as NASA, government research labs, or defense-related labs. Others become writers for more general audiences, publishing articles or books on popular science, and some even write science fiction. There's a wide range of potential job opportunities.

Physicists have many sides to their personalities as do people in other professions. I have always danced—ballet and jazz—and I have used scientific papers I have written as the basis for some of the science in my three published science fiction novels.

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For more information

Society of Physics Students

One Physics Ellipse

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<http://www.aip.org/education/sps/sps.htm>

American Institute of Physics and

The American Association for Physics Teachers

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Email: aipinfo@aip.org

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<http://www.aip.org/>

Visual Physics for Students

<http://library.advanced.org/10170/menuuf.htm>

For careers in health physics/radiation protection:

<http://www2.hps.org/hps/>

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Statistician

What is a statistician?

The stereotype of a statistician tabulating and summarizing masses of numbers fails to capture the diversity and creativity of statistical work. A statistician does collect and analyze data, but there are many aspects of this work, and as a statistician you will be involved in all of them. You will design sample surveys and laboratory experiments to maximize the information gained within time and budget constraints. You will modify standard analytical techniques so that they can be applied to the available data. You will also spend time educating students and colleagues about what statistics can and cannot do and learning from those colleagues about their problems.

Statisticians can be classified as “applied” or “mathematical,” although those with advanced degrees find that they wear either hat as the occasion requires. An applied statistician primarily works at solving problems for and with clients from other disciplines, frequently as a member of a multidisciplinary team. A mathematical statistician evaluates existing statistical techniques, devises new ones, and explores the underlying mathematical theory, often within the statistics or mathematics department of a university or other research institution.

What makes a good statistician?

The range of study areas in which statistics can be applied is enormous, and good statisticians take an interest in a broad spectrum of scientific and sociological problems. While they usually specialize to some extent, for example in applications related to medicine, engineering, or economics, they are versatile and enjoy learning about new areas of application throughout their lifetimes.

A critical skill is the ability to extract the important features of a problem from a mass of facts. A statistician must be at ease with mathematical concepts and must be able to formulate new problems in mathematical terms. In the last two decades, high-speed computers and new data-visualization techniques have revolutionized statistics, so it is essential to know how to use computers effectively.

Although they may prefer working with “things” rather than people, statisticians must be able to communicate with people outside their field as well as with their statistical colleagues. They must be both willing and able to go more than halfway to understand the problems and constraints of the researchers and other clients with whom they work, and to explain statistical conclusions to those with little or no statistical training.

What is life as a statistician like?

The long-term rewards come both from being part of the discovery process and from helping managers, teams, and researchers to make sound, data-based decisions. On a day-to-day basis, statisticians take pleasure in revealing the structure underlying a set of data and in using logic and mathematics to solve real-world problems. Like most jobs, statistics also requires a fair amount of plugging along at more mundane tasks, debugging computer programs, or proofreading reports. Perhaps the most frustrating aspect is the multiple demands on your time, keeping several projects going at once, and sometimes feeling unable to do justice to any of them.

If you are associated with a university, you will be teaching and helping students. As a statistician in any organization, you will spend time both on consulting on quick problems and learning in depth about new ones. You will need to review current journals both to find the right technique for a new problem and to keep abreast of new developments. You will probably do some traveling to meetings and short courses in the course of your consulting work.

How do I become a statistician?

A few universities offer a bachelor’s degree in statistics, but many statisticians obtain their bachelor’s degree in another field, such as a natural science, economics or sociology, or mathematics or computer science. With any degree that includes a strong background in mathematics (calculus, linear algebra, one or two courses in probability and statistics, and some computer science), you can work with other statisticians, conducting surveys and running standard data analyses.

Most statisticians complete a master's degree, which equips them to work independently on applied statistical problems. Here the training is more specialized, including several courses on statistical theory and methods as well as valuable consulting experience under the guidance of a faculty member. It is important to take courses in one or more areas where you might apply statistics (e.g., in the natural or social sciences) and to learn to use the computer creatively as well as being familiar with the commercially available statistical software. As part of your general background, you might also take courses in technical writing and in the history and philosophy of science.

To become a mathematical statistician, teach at a university, or obtain a job in which you devote part of your time to research, you will probably need a Ph.D. degree. This involves further course work in specialized areas of statistics as well as writing a dissertation that represents an original contribution to the field of statistics.

Where/what are the jobs?

The demand for statisticians continues to be strong. Industry employs about two thirds of all statisticians in many kinds of work: pharmaceutical research, quality control and reliability engineering, development of agricultural products, marketing and forecasting, and dozens of other areas. Government is concerned about demography, labor force surveys, natural resource estimation, and environmental monitoring, among other areas, and currently employs 10% to 15% of working statisticians. Established individuals with advanced degrees occasionally go into business for themselves, consulting for industry and government. Universities and colleges need statisticians with advanced degrees who will teach and collaborate with students and faculty in other fields.

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For more information

The American Statistical Association (ASA)
1429 Duke Street
Alexandria, VA 22314-3415
<http://www.amstat.org/>

The American Statistical Association (ASA) is the largest association of statisticians in the United States. Its Web page provides links to many sources of information.

Checkout

"Careers in Statistics," "Education" and "Professional Opportunities" (all accessible from the ASA home page), as well as the links under 'Related Information.'

Technical Communication

What is a technical communicator?

Whenever you talk, write, or make a hand gesture, you're communicating information. When you write a procedure for safely operating equipment, draw a diagram to show how a machine works, or explain to someone else how to use a computer program, you're communicating technical information. Technical communication is the literature of science and technology.

Have you ever used a help screen in a computer program? Used a CD-ROM to play a game? Surfing the Web by clicking on your favorite links? Used a safety procedure? Assembled a bicycle? Read an article in *Scientific American*? Used a diagram to help set up your family's computer? If you have, you've used the product developed by a technical communicator.

The information developed by science and technology must be recorded. Sometimes it must be written in clear, uncomplicated language for nonspecialists in the subject; sometimes it must be presented in great detail for specialists.

Technical communicators produce material that conveys scientific and technical information precisely, accurately, and clearly. The projects that technical communicators work on are as varied as the companies and laboratories that do the research. Although producing online documentation or writing for technical publications may be a communicator's primary responsibility, she may also be expected to produce speeches, news stories, scripts for videos and films, or electronic publications.

What makes a good technical communicator?

If you can express yourself clearly in writing and speaking, and if you are curious about science and technology, you have two important qualities of a technical communicator. You should also enjoy interacting with people and be enthusiastic about learning about new ideas.

You must be able to do research and be persistent in finding facts; able to listen, observe, and verify; and able to separate fact from hearsay or fantasy. You must also be able to think clearly, pick out important facts, and organize separate items into a clear, logical, and accurate whole. And, of course, you must be able to write well.

What is life like as a technical communicator?

A technical communicator is typically a very busy person with many demands on her time. Because much technical material explains current research, introduces a new technology, or provides information necessary for others to do their work, time is an important factor in most technical communication jobs. A technical communicator is often working on several projects at once, some with strict deadlines. Or, as documentation manager, she may be responsible for just one large project—from concept to finished product. A technical communicator may work with many people during the evolution of a product: scientists, engineers, photographers, printers, and other communicators such as technical artists, user interface specialists, production team members, quality assurance people, and other specialists. She does most of her work at a computer terminal.

The rewards in technical communication come from seeing your work published on paper or appearing on-line, from the challenge of taking complex technical information and translating it into a useful product, and from working with other people.

How do I become a technical communicator?

The usual educational preparation for a career in technical communication is a bachelor's degree with emphasis on both writing and science. Many colleges and universities offer courses in technical communication, scientific journalism, and technical art. Many schools have four-year bachelor's degree programs in technical communication, and many universities offer master's and Ph.D. degrees in the field.

In high school you should take as many courses as you can in English, the sciences, math, social sciences, and art. You should make a conscious effort to build your vocabulary and learn to use words carefully and accurately. If the university of your choice does not have a degree program in technical communication, you should consider taking many courses in science and mathematics and courses in composition, literature, journalism, graphic arts, and linguistics. Such a program would prepare you well for selling your talent as a technical communicator.

An increasing amount of technical communication is produced digitally in the “paperless office.” The growth of nonprint, nonlinear information, such as that found on the Web, is almost explosive. To meet the demands of rapidly changing technologies and ways of finding and using information, the technical communicator must also be accomplished in using computers and computer technologies.

Where/what are the jobs?

The sciences requiring technical literature and art include engineering, physics, mathematics, chemistry, medicine, and the computer industry; but there is a need for technical communication wherever scientific or engineering work is done—at a research laboratory, a university, a chemical manufacturing company, an assembly plant, or a software company. Producing technical material has become a part of business and government. Hundreds of technical journals and Web sites are devoted exclusively to scientific and engineering subjects.

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For more information

There are many professional societies for the technical communicator. Membership will prove profitable and pleasant, with the opportunity to share your experiences with others engaged in similar activities. The principal professional society for technical communicators is the Society for Technical Communication. Professional groups for more highly specialized technical communication include Nuclear Energy Writers Association, Association of Petroleum Writers, Aviation-Space Writers Association, National Association of Science Writers, American Medical Writers Association, and American Computing Machinery’s Special Interest Group for Documentation. On the Web you can find these and other professional organizations that reflect your own interests.



Toxicology



What is a toxicologist?

A toxicologist studies the adverse effects of chemical agents on biological systems. The toxicologist performs studies to determine how easily a chemical enters an organism, how it behaves inside the organism, how rapidly it is removed from the organism, what cells are affected by the chemicals, and what cell functions are impaired.

The professional activities of toxicologists fall into three main categories: descriptive, mechanistic, and regulatory. The descriptive toxicologist is concerned directly with toxicity testing. In this field she designs the appropriate toxicity tests in experimental animals or cell cultures to yield information that can be used to evaluate the risk posed to humans and the environment by exposure to specific chemicals. The mechanistic toxicologist is concerned with determining the mechanisms by which chemicals exert their toxic effects on living organisms. The regulatory toxicologist has the responsibility of deciding (on the basis of data provided by the descriptive toxicologist) if a drug or other chemical poses a sufficiently low risk to people when marketed for a stated purpose.

What makes a good toxicologist?

Good toxicologists are curious about the way chemicals and environmental factors interact with the body. They must be interested not only in the final outcome of that interaction but what goes on at the molecular level (i.e., how individual chemicals interact with cells and cellular functions). A toxicologist must be capable of critical thinking and have good observation skills. She must be a good communicator and have a strong background in biology, chemistry, biochemistry, pharmacology, and anatomy. Writing skills are essential for getting project funds and for publishing results. Good oral presentation skills are important for communicating results and providing data to regulatory boards.

What is life as a toxicologist like?

Toxicologists address their hypotheses by observing the effects of model compounds in whole animals and cellular extracts. Therefore, they must be willing to work with animals in a humane and appropriate manner to develop information that is necessary to translate to human applications. Because chemical interactions involve various biological systems, toxicologists must be able to work with researchers in other fields outside of toxicology to get necessary data to understand important mechanisms. In addition, researchers in applied toxicology must have a broad understanding of the field in order to provide information to forensic, clinical, or regulatory agencies.

How do I become a toxicologist?

Toxicology is a broad field that can accommodate many interests. To become a toxicologist you should take as much math and science in high school as possible. Be sure to study biology, chemistry, physics, and math such as trigonometry, algebra, and calculus. In addition to general studies, your undergraduate education should include environmental studies, biological sciences, biochemistry, chemistry, physics, calculus, and statistics. Courses in areas of specialization can be taken in graduate school to obtain M.S. and Ph.D. degrees in toxicology.

What/where are the jobs?

Toxicologists can work in research positions at universities and private industry and applied areas primarily in private industry and government. Research in toxicology can include studies of the toxicity of chemicals on the various systems of the body including nervous system, endocrine system, digestive system, respiratory system, immune system, and cardiovascular system. Such research can assess the effects of toxicity on such target organs as the kidneys, lungs, liver, heart, eyes, etc.

Applied toxicology includes studies in three specialized areas: forensic, clinical, and environmental. Forensic toxicology is a hybrid of analytical chemistry and fundamental toxicological principles. It is concerned primarily with the establishment of cause-of-death in postmortem investigations. Clinical toxicology is concerned with the effects of drugs on disease or with abuse. The clinical toxicologist provides important information to emergency room physicians and nurses. Environmental toxicologists usu-

ally study the effects of pollutants on wildlife and subsequently on the ecosystem, including the effects of environmental pollutants on humans.

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For more information

Society of Toxicology
<http://www.toxicology.org/main.html>

Society of Forensic Toxicologists
<http://www.soft-tox.org/>

Federation of American Societies for Experimental Biology
<http://gopher.faseb.org/>

Chemical Industry Institute of Toxicology (CIIT)
<http://www.ciit.org/>

WEB Toxicology Resources
<http://www.uky.edu/Subject/toxicology.html>

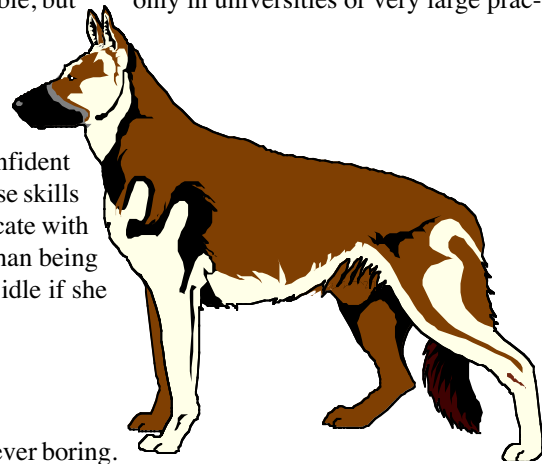
Veterinary Science

What is a veterinarian?

A veterinarian is a surgeon, a dentist, a radiologist, an internist, an ophthalmologist, a neurologist, and a pathologist for cats, dogs, sheep, pigs, horses, cattle, goats, birds, fish, rabbits, gerbils, hamsters, etc. Most veterinarians do not specialize beyond working on small or large animals. A specialty in the various fields mentioned is possible, but only in universities or very large practices in large cities.

What makes a good veterinarian?

A good veterinarian is skillful with her hands, enjoys solving problems, is confident in handling animals, and has a broad knowledge of medicine and surgery. These skills can be learned, but they are of little value if the veterinarian cannot communicate with people. Being able to interact with people is actually much more important than being able to interact with animals; the most skillful veterinarian will probably sit idle if she does not enjoy people.



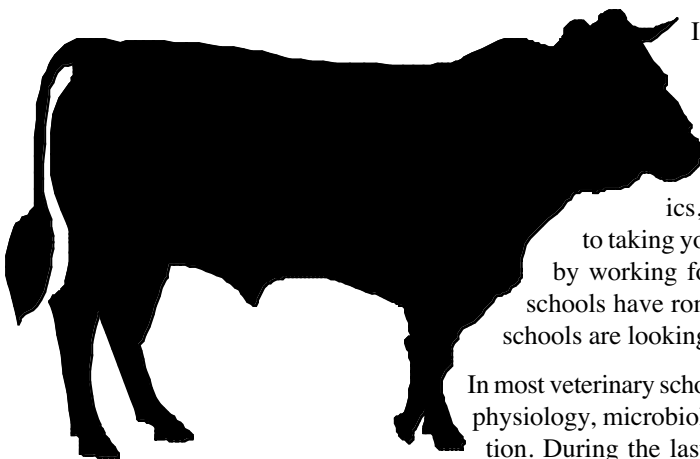
What is life as a veterinarian like?

Life as a veterinarian is rewarding, frustrating, and time consuming, but it is never boring.

A major portion of the work itself is routine; nevertheless, no two animals and no two owners are alike, so each case is a new challenge. Only a very small portion of the work involves gloriously saving lives or performing miraculous surgery. A lot of time is spent at the south end of a north-facing animal. A typical day might include performing surgery; seeing animals with health problems; giving inoculations; going out on calls in the country; working at a racetrack; working in a zoo; establishing a herd health program for a feedlot, dairy farm, or large poultry operation; inspecting meat at a slaughterhouse; or doing research for a drug company. In the evening you might be called back to the office to deal with an emergency that often turns out to be an animal that has been sick for two weeks. The call usually comes just as you sit down to eat or just as you go to bed. After you have helped an animal that truly needs your help, however, it seems worth the trouble.

How do I become a veterinarian?

To receive a doctor of veterinary medicine (D.V.M. or V.M.D.) degree requires a minimum of three years in college plus four years in veterinary school. Most people are not accepted in veterinary school, however, without completing four years of college. To obtain a license you must pass written and oral examinations.



In high school, a college preparatory curriculum that includes math and science is good preparation for the courses you need in college. Any courses that help develop skills in dealing with people are beneficial.

Most pre-veterinary curricula include biology, math, physics, chemistry, English, and some sociology courses. In addition to taking your college courses, it is important to gain practical knowledge by working for a veterinarian. Too many students applying to veterinary schools have romantic ideas about being a veterinarian; therefore, veterinary schools are looking for people who know what they are getting into.

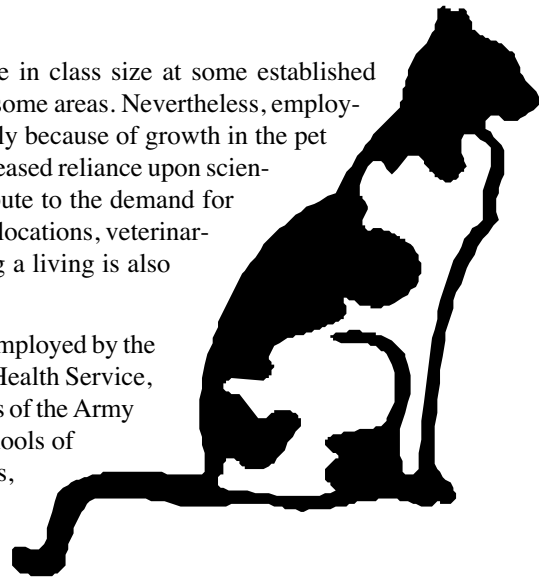
In most veterinary schools, you do not have a choice of classes. You will take anatomy, physiology, microbiology, pathology, medicine, surgery, pharmacology, and nutrition. During the last two years you work mainly in the clinic gaining practical knowledge.

Where/what are the jobs?

Because of the opening of several new veterinary schools and the increase in class size at some established schools, new veterinarians may face competition in establishing practices in some areas. Nevertheless, employment is expected to grow faster than the average for all occupations, primarily because of growth in the pet population. Growth in public health and disease-control programs and an increased reliance upon scientific methods of raising and breeding poultry and livestock will also contribute to the demand for veterinarians. While an oversupply of veterinarians seems imminent in some locations, veterinarians will probably always be needed in remote rural areas; however, making a living is also harder in these areas.

The majority of veterinarians are in private practice. About seven percent are employed by the federal government, chiefly in the Department of Agriculture and the Public Health Service, with a small number serving as commissioned officers in the veterinary services of the Army and Air Force. Other employers are state and local government agencies, schools of veterinary medicine, research and development laboratories, large livestock farms, and pharmaceutical companies that manufacture drugs.

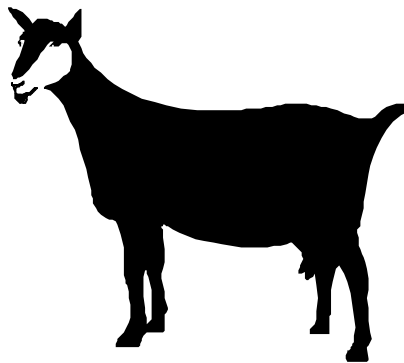
Patricia M. Moore, (1984)
Doctor of Veterinary Medicine



For more information







A free pamphlet entitled *Today's Veterinarian*, which contains additional information as well as a list of colleges of veterinary medicine, can be obtained by sending a self-addressed stamped envelope to:

American Veterinary Medical Association
930 N. Meachem Rd.
Schaumburg, IL 60196



Selecting an Occupation

So, the time has come for you to “get a career,” but where do you start? Well, you’ll find most of the information right inside yourself. Start by assessing your values, interests, skills and personality characteristics. Here are a few questions to get the ball rolling:

-  What important decisions have you made, and what values were inherent in those decisions?
-  Think about the times when you have been angry, frustrated, overjoyed, or ecstatic. What were the underlying values present in those situations?
-  What hobbies do you have, and what do you like about them?
-  What are/were your favorite and least favorite high school subjects and why?
-  What adjectives describe you? How would others describe you?
-  How do you define success?






Next, allow yourself to dream. What might a day in your life look like ten years from now? If you could clone yourself into five people, what different occupations would each of the five do? What is similar about all five? What’s different?

After you have a pretty good idea of who you are and what characteristics you wish to display in the world of work, it’s time to get information about what’s out there. How do you do this research? There are several ways. One is to go to the public library or to a career resource center (colleges and universities usually have them) and see what information they have on your desired occupations. You can also check the Internet or write to the professional/trade association (find where to write in *the Encyclopedia of Associations* in the reference section of a library). Some high schools, colleges, and universities may also have a computer guidance system to help you. But really, the best source of information about any occupation comes from the people who are currently doing the job. Find out who they are and request a short (twenty-minute) interview with three or four people who work in different settings. Maybe they would let you follow them around for a few hours or even for a whole day to experience what life on the job is really like.

Here’s an example. Let’s say I’m interested in engineering, but I’m not sure what area specifically. My mom has a friend that’s an electrical engineer at Intel, our neighbor is a chemical engineer at Los Alamos National Laboratories, and my brother’s friend is a civil engineer for the highway department. I arrange to interview each of these three people and they even let me follow them around (job shadow) for a few hours. After these experiences, I have a much better idea of what tasks and environments are involved with these types of jobs. Of course, I would also take the opportunity to get advice on how I should proceed with my career from these experts! (Don’t forget to send a thank you card or letter for their time!) I may have found that none of these areas are for me, so it’s back to the library to research some other areas.

It is important to remember that you are a woman of many talents, and there are many ways you can display these talents in the world of work. What may be an ideal job now may be boring in five years. What is only a hobby now may become your primary source of income in the future. A career is a succession of vocations and avocations (e.g., hobbies) over a lifetime. You have one career which may be made up of many different jobs in different fields. The best thing to do is to continue exploring occupations of interest and occasionally reassess your values, interests, skills and personality characteristics to see which talents you wish to display in the world of work at any given time. Explore! Explore! Explore!

Now that you’ve assessed your values, interests, skills and personality characteristics, weave it all together into a “job wanted” ad as if it were to appear in the classified advertisements. Use the following outline to help you:

-  The functions I would perform are (skills and abilities):
-  The organization I work for will share my following goals (values):
-  I will work with people who have the following traits (my personal qualities/values):
-  The environment I work in would use one or more of the following special knowledge or interest areas (interests/special knowledge areas):
-  Other areas I want my ideal job to include:

Next, target your resume for your ideal job.

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Why Take High School Mathematics?

A good foundation in mathematics in high school can be your passport to a challenging, high-paying job that provides personal satisfaction. Four years of mathematics, including algebra, geometry, and trigonometry, are essential for entry into the standard freshman calculus courses required for undergraduate majors in engineering, science, business administration, and computer science. Even the social sciences and the humanities are making use of mathematics, statistics, and computer techniques; high school mathematics will increase your understanding of such techniques.

Admission to college requires the ACT, an aptitude test administered by the American College Testing Service, or the SAT, the Scholastic Aptitude Test. Both tests include questions on high school algebra and geometry. Furthermore, a passing grade on national admissions tests to dental, medical, or veterinary schools requires a strong background in high school mathematics and college calculus; the law school admissions test requires high school mathematics.

Unfortunately, every year students graduate from high school without having these subjects. Algebra and geometry, in particular, should be taken by all high school students, whether or not they plan to attend a four-year college or university. These subjects are required even for traditional careers (such as nursing, physical therapy, and art) and for entry into technical vocational programs that do not require a college degree (such as electronics, laboratory technology and paramedical careers).

You may be tempted to avoid courses considered difficult such as algebra and geometry and, instead, take easier mathematics courses. However, if you have not had these more difficult subjects, you will be undereducated for today's job market; doors will be closed to many jobs you might otherwise obtain. A student who earns a C in algebra or geometry will have more career options than a student who earns A's in easier mathematics courses. In high school mathematics you learn how to express relationships between different quantities by using mathematical equations. More importantly, you learn to reason logically; such a skill is useful regardless of whether you ever see an equation after you graduate.

However, suppose the particular career you choose does not require high school mathematics. Like many high school students, you may be sure that you already know what career you want to pursue. Nevertheless, you will find, as many before you have found, that your life goals can change. If you take sufficient mathematics in high school, you can more easily attain your new goals.

It is possible to make up the high school mathematics you have missed. However, this may delay you in getting started in your major if you do decide to go to college, and remedial mathematics courses may not count towards your degree. Furthermore, math will seem much harder after you have been away from it for a few years, and your remedial college mathematics courses will be much faster-paced than high school courses.

Mary Ann Sweeney
Physicist (1984)
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Education Options After High School and College

After High School

Three basic educational options are available after high school:

A **certificate** program in a vocational field usually requires 12 to 18 months to complete.

An **associate degree program**, Associate of Arts (A.A.) or Associate of Science (A.S.), usually requires two years for completion.

A **bachelor's degree** program such as Bachelor of Arts (B.A.), Bachelor of Science (B.S.), or Bachelor of Business Administration (B.B.A.) usually takes four years.

Option 1

Certificate programs

For students choosing the first option, follow-up courses are available for later enrichment. Certificate programs do not have set requirements, but many expect high school graduation or a GED certificate, obtained by passing a high school equivalency test. Some vocational schools (e.g., TVI in Albuquerque) require basic skills tests. Financial aid, frequently based on need, is available in the form of loans, grants, scholarships, or work-study programs.

Option 2

Associate degree

With the second option, transfer to a four-year program is possible with much of the first two years' work counting. Associate degree programs generally require high school graduation or the GED certificate. Some, such as the New Mexico Military Institute, require a specific number of college preparatory courses

Option 3

Bachelor's degree

Bachelor's degree programs require graduation or the GED certificate. A few colleges, including St. John's College, accept students under special circumstances who are just finishing their junior year. Required preparatory courses vary, but most colleges require fifteen to eighteen high school units (one unit for a full-year course): usually three units in English, two to four in mathematics, two in science, two in social science. Out-of-state schools often require two units in a foreign language; New Mexico schools do not. New Mexico schools generally require the ACT, an aptitude placement test administered by the American College Testing Service; out-of-state schools usually require the SAT, the Scholastic Aptitude Test. In addition, some schools require achievement tests in specialized subjects. Graduate programs are available for students choosing third option.

Think About College Now!

Any High School Graduate Can get a
Virtually Free Education

by Tony Oviedo, Managing Editor,
Bobcat's Eye, McCurdy School

Juniors, if you haven't started to look at colleges, it would be best to start now.

How, you say? Well, I'll tell you: go to the counselor's office as soon as you can and give him or her a list of colleges that you might be interested in. If you don't do it this school year, there's no way you can get the best deal possible. If you don't have a case of wanderlust and don't mind staying in state, then it's simple. You can wait to get your scholarship applications and admissions forms early next school year.

If you are under the impression that scholarships are exclusively for the smart kids, you're wrong. Anyone graduating from high school can get a virtually free education, that is, in New Mexico, of course.

It's simple. All you have to do is apply for all the scholarships that you qualify for, and if you don't get one of those, you automatically receive the Lottery Scholarship. It may seem like a lot of work, but in actuality it only takes a couple of hours. It's the easiest money you'll ever make.

Now, for all the seniors: If you have done nothing toward college at this point, go talk to your counselor and pray.

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Where to Get Your Education

Your future career can be strongly affected by where you choose to get your education. Follow the decision-making model described in a separate chapter of this booklet (“Selecting an Occupation: A Decision-Making Model”) in selecting a school. Determine your objectives based on the career path you hope to follow, and determine what school can best meet these objectives. Consider all kinds of post-secondary school education: technical-vocational schools, two-year community colleges, four-year liberal arts colleges, universities, and service academies.

To make your educational experience a positive step toward your future, compare information from different sources: parents, teachers, guidance counselors, alumni, friends, school catalogs (see a local public or college library), school career resource centers, and college entrance guides. A yearly publication entitled “Consumer Guide to Post-Secondary Education” provides general information on all in-state (New Mexico) schools; copies are available at high schools and post-secondary schools. Another vital source of information is special senior programs such as Senior Days at colleges or College Day programs where college representatives recruit potential students. Ask all the questions necessary for you to feel comfortable with your choice.

Selecting a Campus

How do you select a campus best suited to your career interests and personality? Factors to consider in this selection are as follows:

- ☐ Degree program availability; majors offered
- ☐ Academic level of competitiveness
- ☐ Location: Is the school near or far from home?
- ☐ Do you like the setting (urban or rural) and climate?
- ☐ Size
- ☐ Atmosphere: Does the atmosphere of the school and community suit your personality and lifestyle?
- ☐ Coed or women’s college
- ☐ Religious orientation
- ☐ Campus organizations and activities
- ☐ Public or private school
- ☐ Cost
- ☐ Accreditation

Visit the campus

Many of these factors can only be assessed by making a personal visit to the campus. Visit while school is in session, stay overnight, include your parents. Investigate school surroundings and atmosphere, libraries and research facilities, departments of interest, student life, classes, and extracurricular activities. You might contact the placement office for names and employment data of former students in your field of interest. Most schools will arrange for you to visit the campus, have an interview with an admissions officer, and get a guided tour of the campus. The interviewer may ask about your scholastic standing, courses, and extracurricular activities. Interviews are generally not required for state-supported schools except in special circumstances. They are often necessary for application to the smaller private schools, though you might not have the interview at the school (an alumni representative in your locality can conduct the interview).

While colleges offer a wide variety of majors, not all colleges and universities offer the same type of major. For example, in New Mexico, one university offers the only architecture degree in the state. Schools also differ as to the level of degree program offered. Astronomy at one school may be an undergraduate program while it is a graduate program at another school.

The degree of academic competitiveness is all-important. College work should be challenging, but it should not completely overwhelm you. With the aid of parents, teachers, and counselors, you should make an honest self evaluation: How ambitious are you? How independent are you? What are your work habits like?

Location & Size

School location can be an important factor, both in terms of proximity to home and proximity to extracurricular activities. In addition to getting an education, you can use your college years as a time for growing up and becoming independent; if you do go to school close to home and finances permit, you may prefer not to live at home. Consider living in a college dormitory.

Some people prefer the sense of community and togetherness among faculty, students, and administration that is characteristic of a small college, and the sense of being known and of making an individual impression. Others prefer the more varied atmosphere at a large university, where you develop your own community. If you are friendly and outgoing, you can make friends regardless of the campus size. Large lecture courses are rare in small colleges and can be the norm in large universities, especially in lower-level courses. However, in the case of large lecture courses, study groups of about 25 students are held as often as once a week. Many students assume that they will receive more help in a small school because the student-faculty ratio is often smaller. Nevertheless, regardless of the size of the school, you will only receive as much help as you seek. The advantage of a large university is the much greater variety of courses within a given program.

A women's college can give you a perspective through which to look at women and their accomplishments; it can give you the time and opportunity to grow, to change, and to begin to know yourself. Yet, with half of the human race absent except on weekends, it can become a very artificial environment.

Public schools are all coed and are tax supported. Because of this tax support, tuition levels are set by state government, and expenses are lower than at private schools. Entrance requirements are less stringent, and competition for a place in the freshman class is not so keen.

Cost may be a deciding factor. See the article "Paying for Your Education" for a discussion of how to finance your education.







The liberal arts structure can leave room for you to explore different career paths and change the goal that seemed so clear in your freshman year. A student can arrive as a premed student and end up attending graduate school in music and art, or vice versa. A school with a very specialized curriculum, such as an engineering school, does not allow you to "change horses in midstream" so easily.

In selecting several schools to which you apply, be prepared to compromise; no single school will fit your needs and desires in every respect. Keep in mind that the school that is best for your next door neighbor or your brother may not be best for you. In any case, check that the schools to which you apply are accredited and that they offer the program that fits your interests.

Applying to Colleges: A Timetable

Once you decide on several schools, submit applications. Do not make the mistake of assuming that listing the colleges on a Pell Grant application represents application to those schools. (Pell Grants, which were previously known as Basic Educational Opportunity Grants, provide aid to economically disadvantaged students.) Each school has its own application form. The application fees are generally not refundable, so only apply if you are sure of your choice. Apply to several schools if you are interested only in those that are not state-supported; if you only apply to one of these and you are not accepted, you will be left out in the cold.



Junior Year

-  Examine educational opportunities; investigate admission policies.
-  Discuss plans with parents and guidance counselors.
-  Register and take the Preliminary Scholastic Aptitude Test (PSAT) if colleges you are considering require the SAT, and take the National Merit Scholarship Qualifying Test.
-  Consider whom to ask for recommendations (teachers, employers).
-  Visit college campuses.
-  Register for the SAT and Achievement Tests or the ACT, depending on college entrance or placement requirements.






Applying to Colleges: A Timetable (Continued...)

Senior Year




July, August, September

-  Obtain catalogs, applications, financial aid information. (State-supported schools do not supply catalogs.)
-  Have parents prepare Parents' Confidential Statement if required.


October, November

-  Mail completed applications.
-  Determine tests required and take them.
-  Maintain good grades.
-  Request that your high school send official transcripts.
-  Ask teachers and employers to write recommendations.




December

-  Make sure all applications are sent before Christmas if colleges do not have another deadline.
-  Check that transcripts are sent before Christmas, or earlier if the colleges require otherwise.
-  Financial aid forms for state-supported (New Mexico) schools are available.





January

-  Tentative acceptance is sent by some schools to outstanding candidates who have completed all application requirements.

February, March

-  Have high school send official transcripts that include grades for first semester and a list of second-semester courses.
-  Check that all necessary tests have been taken and that applications are complete and all recommendations are sent.
-  Take any required tests.

April, May, June

-  Keep track of acceptances, rejections, and financial aid offers.
-  Many colleges notify applicants by mid April.
-  Application to state-supported schools is often still possible up to one month before the fall semester begins.
-  Reply promptly to colleges accepting you, notifying them of your decision.